

# City of Nashua Community Health Assessment: Healthy Homes & Environmental Health

Researched and created by:

Kristina Kelley

Anne Marie Mercuri

Karen Paddleford

Laurie Warnock

Stephanie Williams

# Project Overview



- ❑ Objectives
- ❑ Healthy Homes Background
- ❑ Process & Methods

# Objectives

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- ❑ **To assist the Nashua Division of Public Health & Community Services (DPHCS) in the development of the Nashua Community Health Assessment – specifically, the Healthy Homes and Environmental Health Chapter**
- ❑ **To present key findings relating to Healthy Homes and Environmental Health to the Community Health Assessment Advisory Board and DPHCS staff**

# The Healthy Homes Initiative

- Coordinated, comprehensive, holistic approach with a goal to prevent illness and injuries that result from housing-related hazards and deficiencies
- **Focus:** To identify health, safety and quality-of-life issues in the home environment and to act systematically to eliminate or mitigate problems



# Influential Factors

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**“The connection between the health & the dwelling of the population is one of the most important that exists.”**

**- Florence Nightingale**

- ☐ **Indoor Air Quality**
- ☐ **Water Quality**
- ☐ **Residential Chemicals**
- ☐ **Housing Structure & Design**
- ☐ **Housing Materials**
- ☐ **Characteristics of Surrounding Areas**
- ☐ **Presence or Absence of Safety Devices**
- ☐ **Resident Behavior**

# The Link to Health

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**“In the United States today, the leading preventable causes of death, disease and disability are asthma, lead poisoning, deaths in house fires, falls on stairs and from windows, burns and scald injuries and drowning in bathtubs and pools.”**

**“Although residents of poorly maintained homes are at increased risk for injury and illness, *no population group is immune to illness or injury occurring in houses.*”**

**“A healthy home is sited, designed, built, renovated and maintained in ways that support the health of residents.”**

# The Link to Public Health

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**Studies demonstrate improved health outcomes with policies that target the home environment:**

- **Lead poisoning prevention policies significantly reduce childhood lead exposure & poisoning in the U.S. (CDC, 2005a, Pirkle et al. 2006)**



- **Smoke alarm policies demonstrate an increase in the prevalence of working smoke alarms & reduced fatalities in the U.S. (McLoughlin et al. 1985)**



# Process & Methods



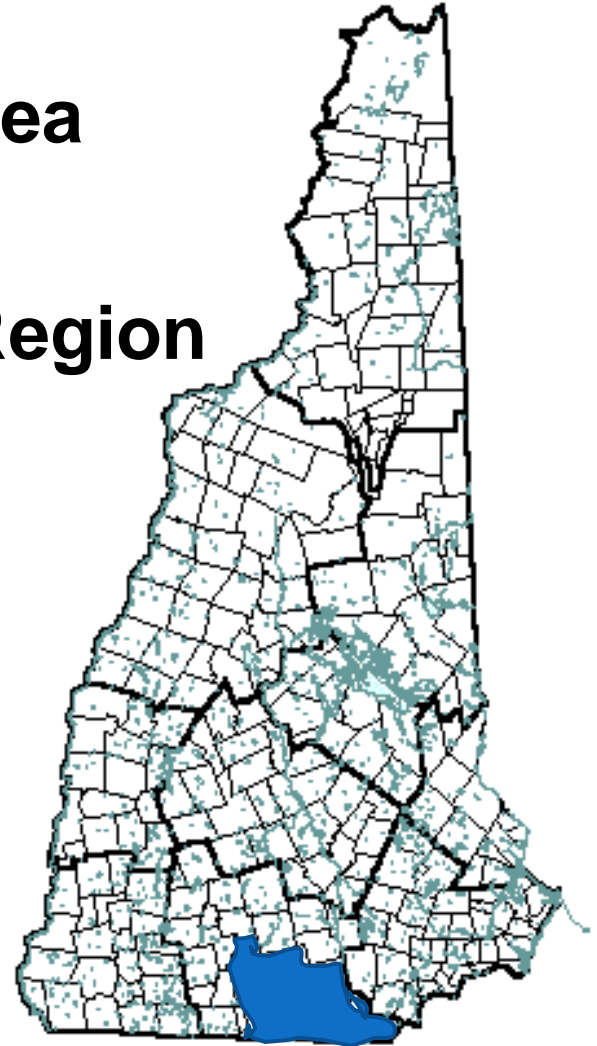
- 1. Collaboration and communication between UNH & DPHCS staff**
- 1. Research of Healthy Homes Initiative**
- 2. Data Analysis in Microsoft Excel**
- 3. Compilation of analysis in chart & graph format**
- 4. Drafting of narrative**
- 5. Presentation of findings to Advisory Board**



# Geographic Areas Analyzed

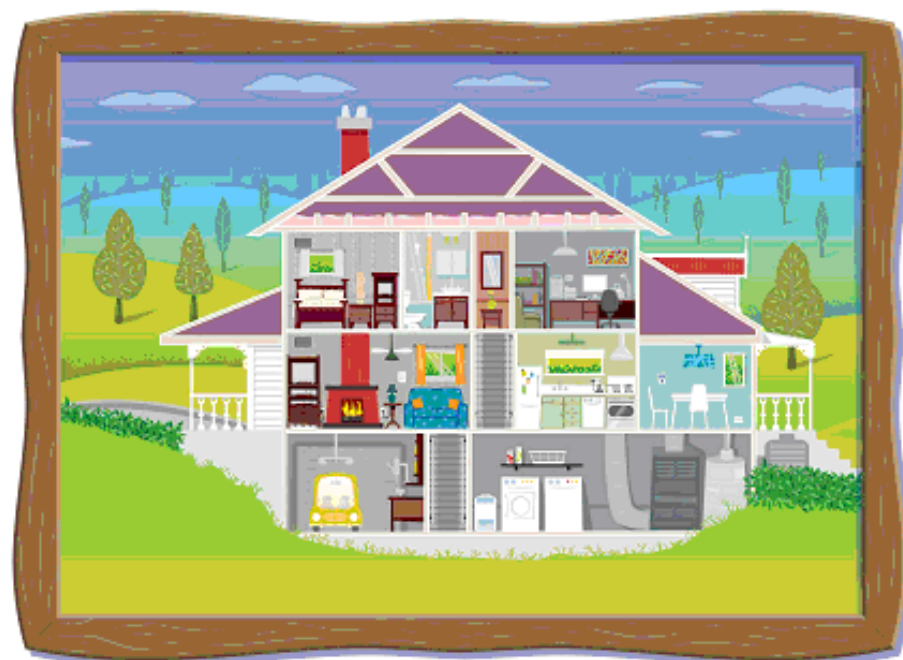
**Areas analyzed varied by topic area**

- ☐ **City of Nashua**
- ☐ **Greater Nashua Public Health Region**
- ☐ **Hillsborough County**
- ☐ **State of New Hampshire**
- ☐ **United States**



# Healthy Homes Topic Areas

- ❑ Lead
- ❑ Unintentional Poisoning
- ❑ Radon
- ❑ Asthma
- ❑ Air Quality
- ❑ Water Quality
- ❑ Tobacco

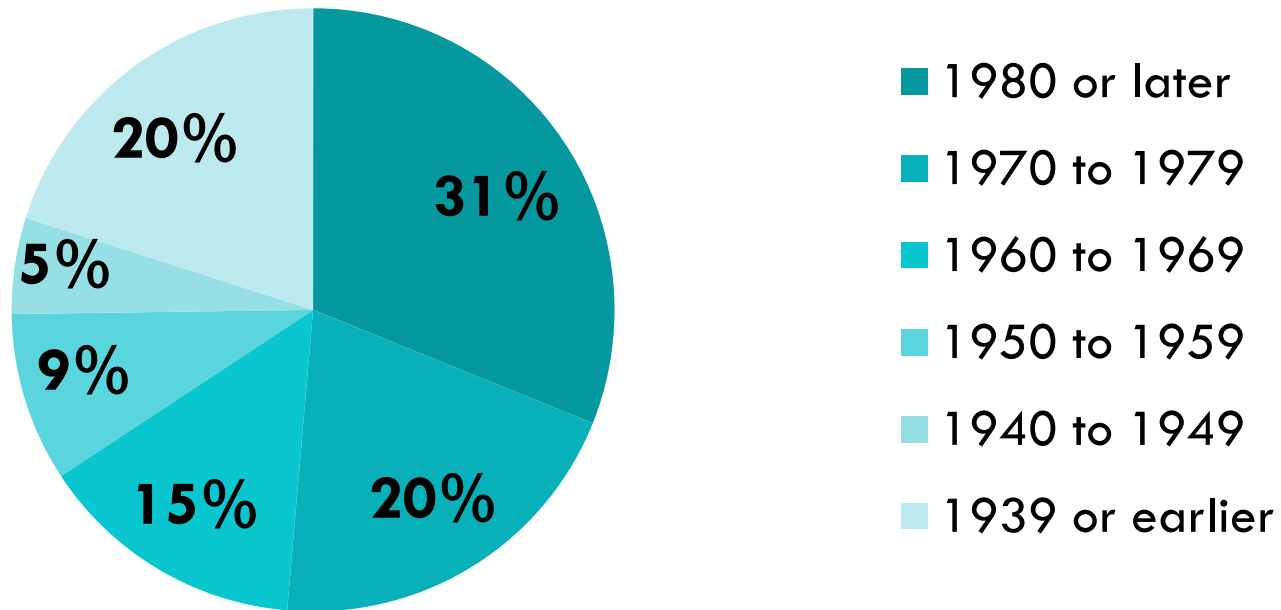


# Lead Poisoning

# Lead Poisoning

- ❑ **Lead is found in various sources in & around the home**
  - **Paint, Dust, Soil**
- ❑ **Poisoning occurs through ingestion**
- ❑ **Children with elevated blood lead levels can develop:**
  - **Damage to the brain & nervous system**
  - **Hearing problems**
  - **Slowed growth**
  - **Behavior & learning problems, such as hyperactivity**

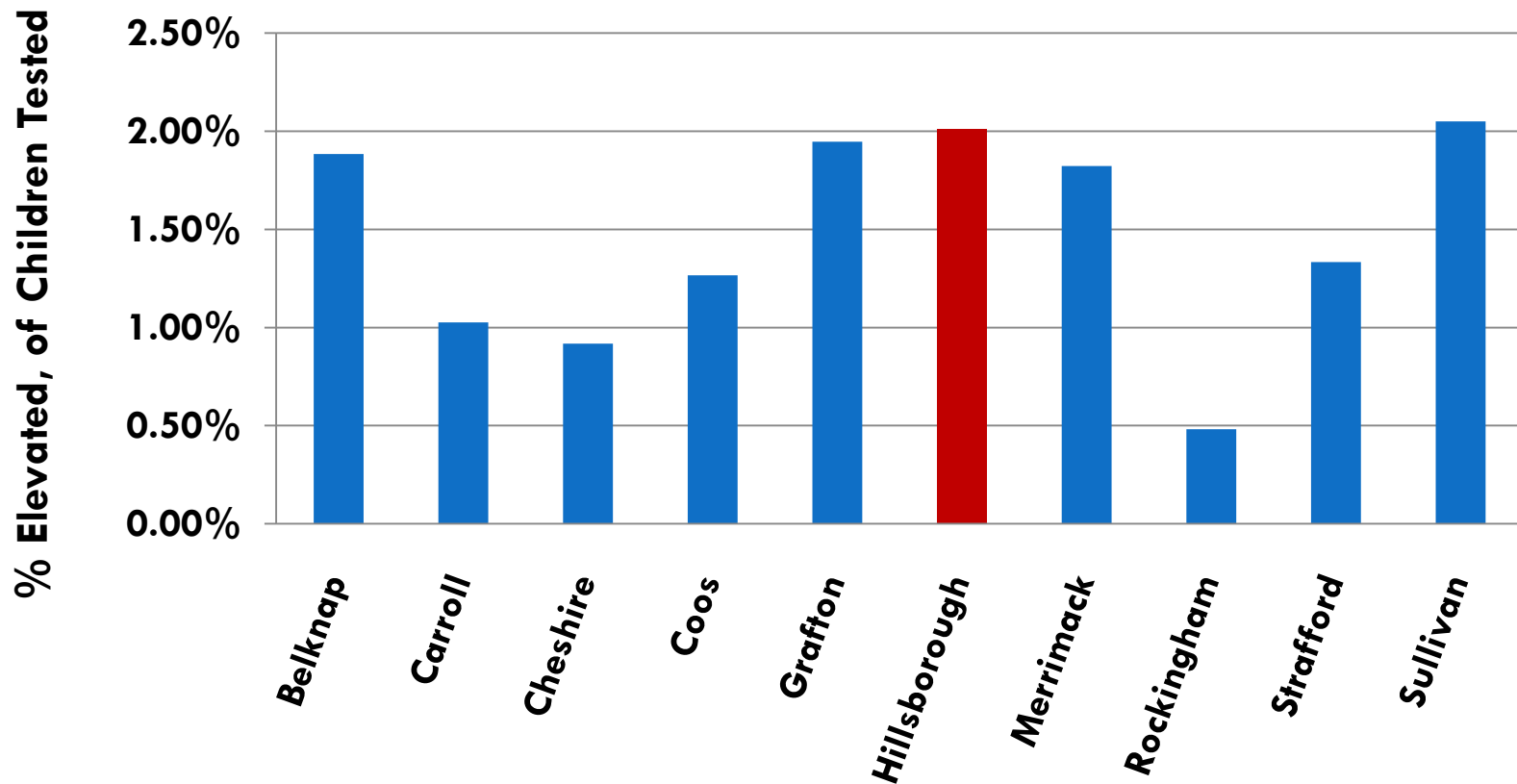
# Nashua Housing: Year Structure Built



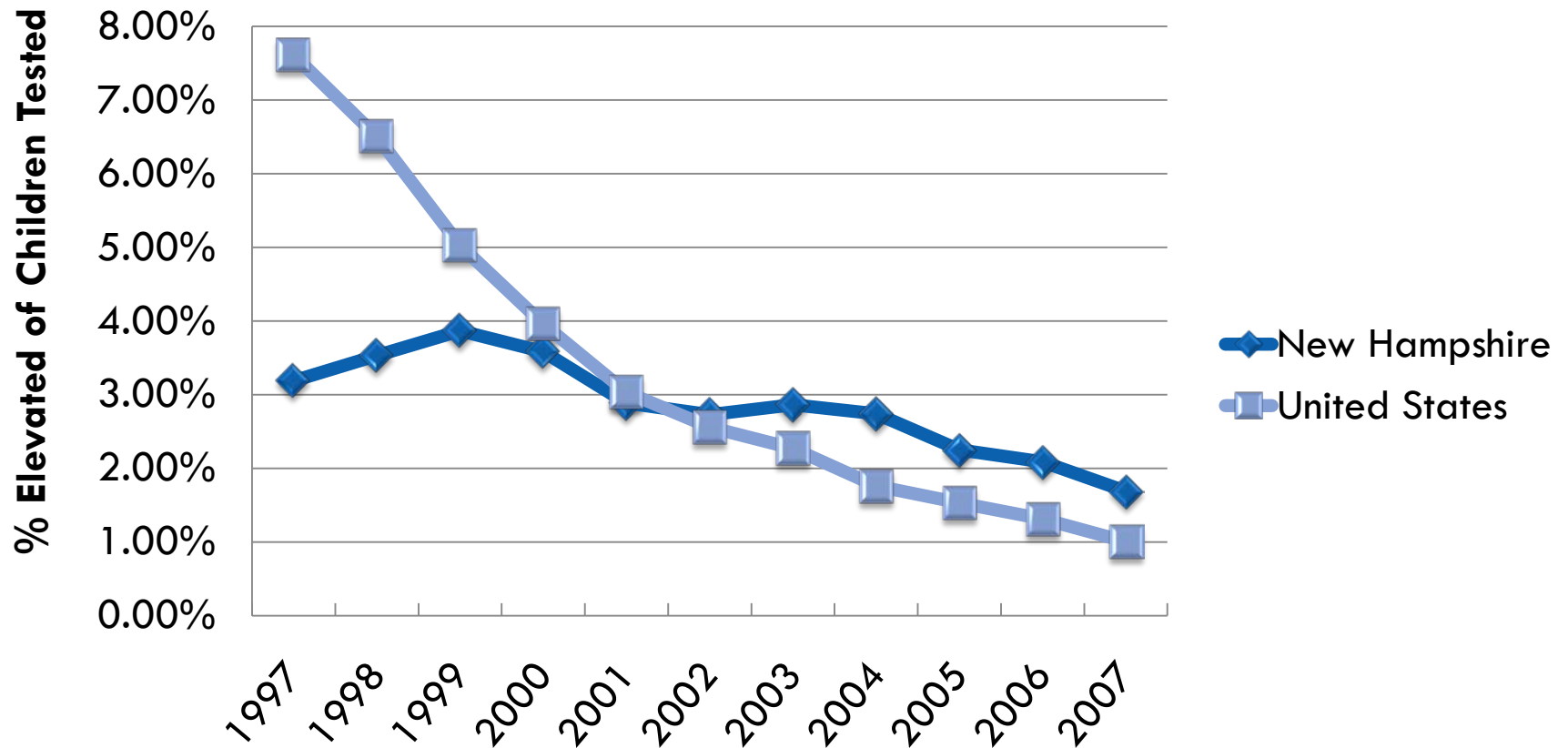
Source: City of Nashua, DPHCS: Application for Childhood Lead Poisoning Case Management and Healthy Homes Promotion Activities . US Census Data.

Having a large proportion of pre-1950s housing puts the city of Nashua in the “Higher Risk” category; additionally, many houses built or renovated before 1978 also have lead paint in them.

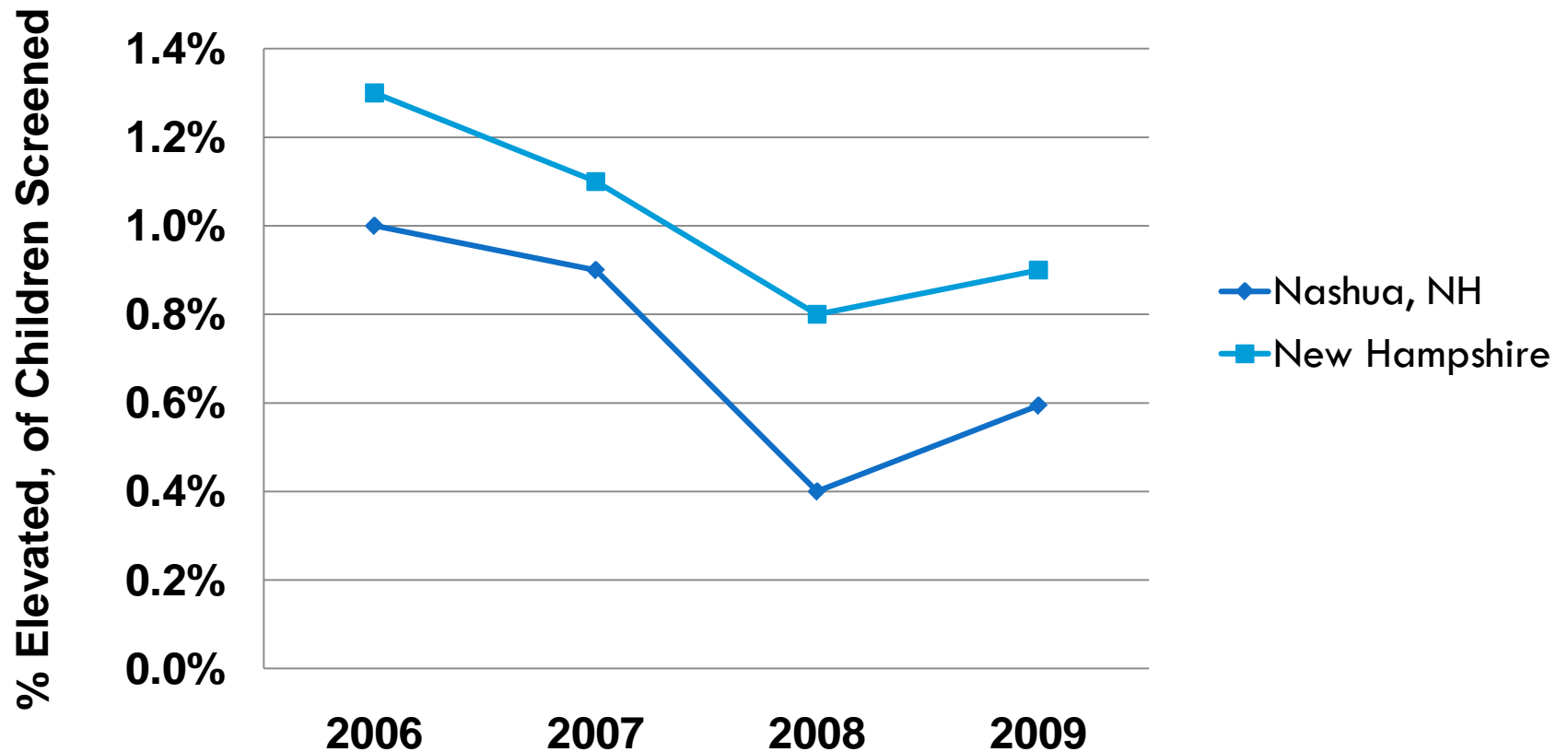
# Elevated Blood Lead Levels by County



# Confirmed Elevated Blood Lead Levels

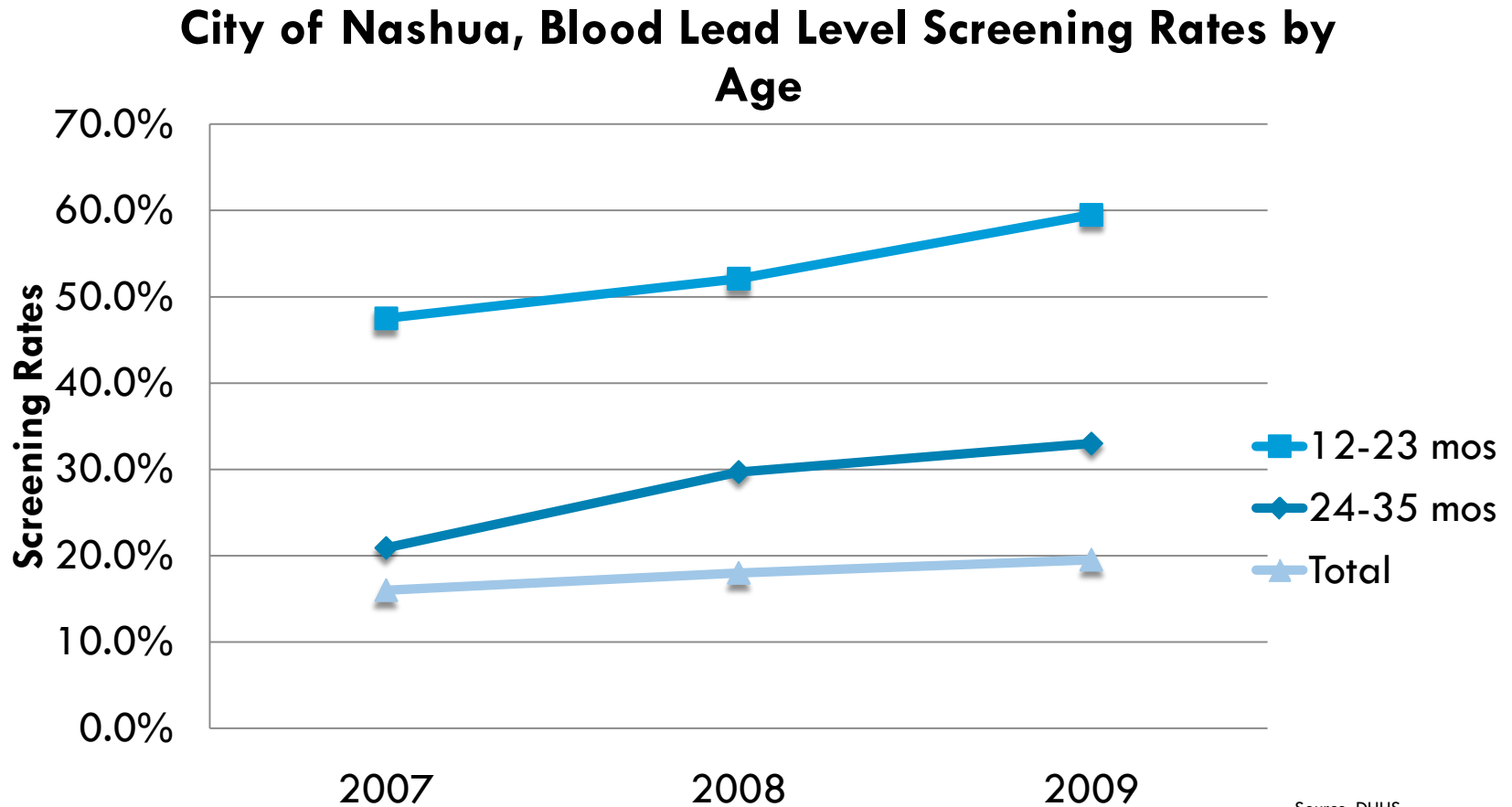


# Elevated Blood Lead Levels





# City of Nashua, Blood Lead Level Screening Rates by Age



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# Unintentional Poisonings

# 2010 Poisoning Data from the Northern New England Poison Center (NNEPC)

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## Unintentional poisoning calls from home settings

### 3 Geographic areas:

- Nashua
- Greater Nashua Public Health Region (GNR)
- State of NH

### 3 Topic areas

- Substances
- Medical outcomes
- Management site



# Poisons in the Home: Substances

The 10 most common exposures across all three geographic regions:

- **Cosmetics & personal care products**
- **Foreign bodies**
- **Topical preparations**
- **Cardiovascular drugs**
- **Antihistamines**
- **Cleaning products**
- **Analgesics**
- **Vitamins**
- **Antimicrobials**
- **Plants, Pesticides**



Image Source: <http://jainreallife.wordpress.com/2010/09/06/americans-drowning-in-prescription-drugs/>

Data: NNEPC, 2010

# Poisonous Substances

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- ❑ **Cosmetics, cleaning products, foreign objects & analgesics equaled 37% of total calls in each geographic area**
- ❑ **Non-pharmaceutical substances are slightly greater hazard among children  $\leq 5$**
- ❑ **Pharmaceuticals were slightly higher among those  $\geq 20$**
- ❑ **People ages 6-19 had the fewest exposures**

# **Poisons in the Home: Medical Outcomes**

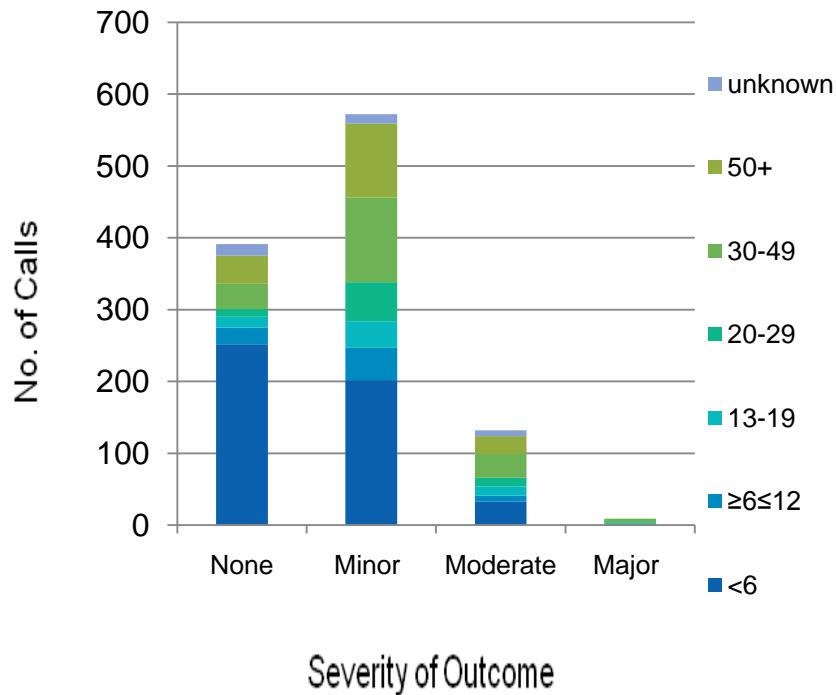
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**The Toxic Exposures Surveillance System (TESS) differentiates medical outcomes as follows:**

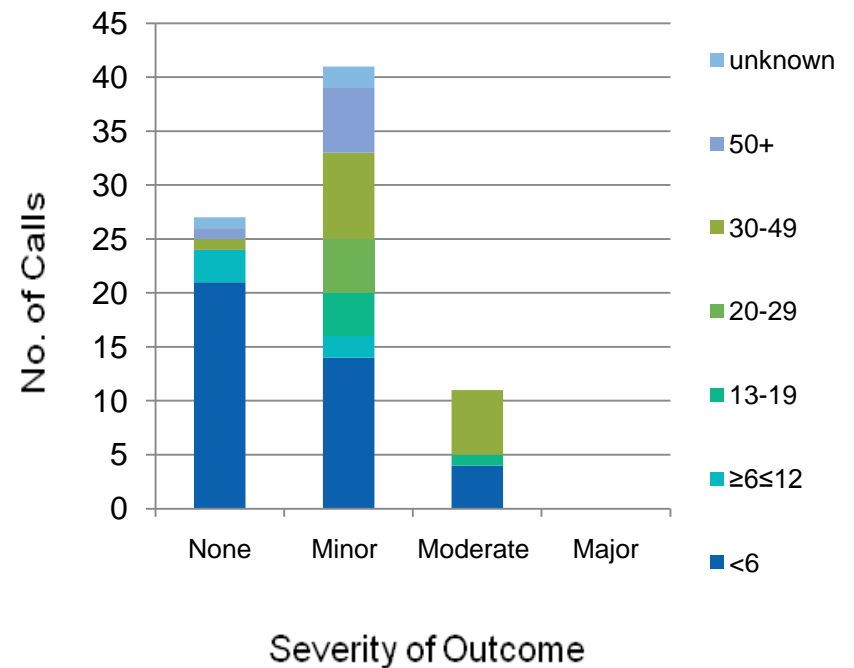
- ☐ **No effect**
- ☐ **Minor effect**
- ☐ **Moderate effect**
- ☐ **Major effect**

# Poisons in the Home: Medical Outcomes

Medical Outcomes, NH



Medical Outcomes, Nashua



# Poisons in the Home: Management Site

- ❑ The majority of calls in all 3 geographic areas were resolved in home
- ❑ National data suggests managing poisonings at home rather than in a health care facility (HCF) saves \$9 for every \$1 spent in a HCF

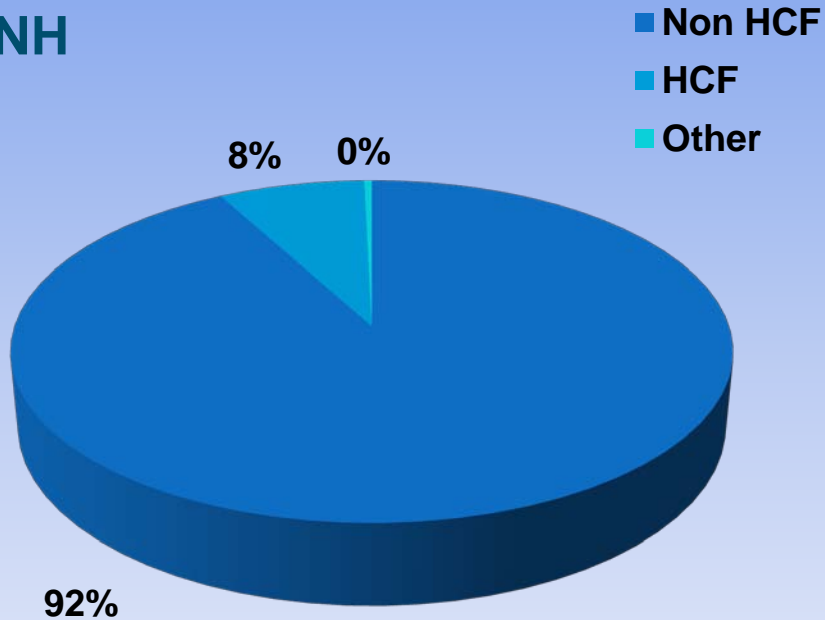


Photo: <http://www.health.state.ut.us/enviroepi/>  
Data: NNEPC, 2010

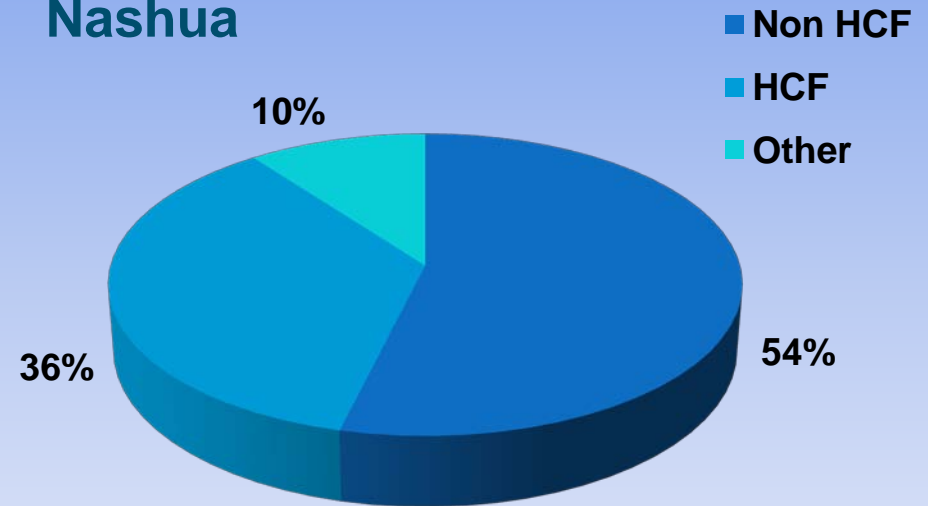


# Management Site

NH



Nashua



# Poisons in the Home:

## Carbon Monoxide

**Carbon monoxide (CO)** is a colorless, odorless gas which is a byproduct of combustion. CO inhalation can interfere with the body's ability to process oxygen via red blood cells. High levels of CO can cause brain damage and death.

- ❑ In ambient air, the majority of CO emissions come from vehicle exhaust.
- ❑ As an indoor poison, CO can come from improperly installed, maintained or vented heating source.
- ❑ Use of CO monitors can reduce the risk of CO poisoning

# Poisons in the Home:

## Carbon Monoxide

### Emergency Department Visits CO Poisoning, 2003-2007

<b>Nashua</b>	<b>24</b>
<b>GNR</b>	<b>70</b>
<b>State of NH</b>	<b>533</b>

### Nashua FD CO Responses 2010

<b>Nature of Call</b>	<b>Number of Calls</b>	<b>Percentage of total calls</b>
<b>CO Incident</b>	<b>36</b>	<b>27%</b>
<b>CO Detector Activation*</b>	<b>55</b>	<b>41%</b>
<b>CO Detector Malfunction</b>	<b>42</b>	<b>32%</b>
<b>Total</b>	<b>133</b>	<b>100%</b>

\* No CO detected



# Radon

# Radon

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**This section of the project analyzed 2008 Behavior Risk Factor Surveillance System (BRFSS) and 1987-2009 New Hampshire Environmental Public Health Tracking (NH EPHT) program data to:**

- **Gain insight on the general public's knowledge of radon**
- **Analyze radon test results from a sample of state, county and city homes**

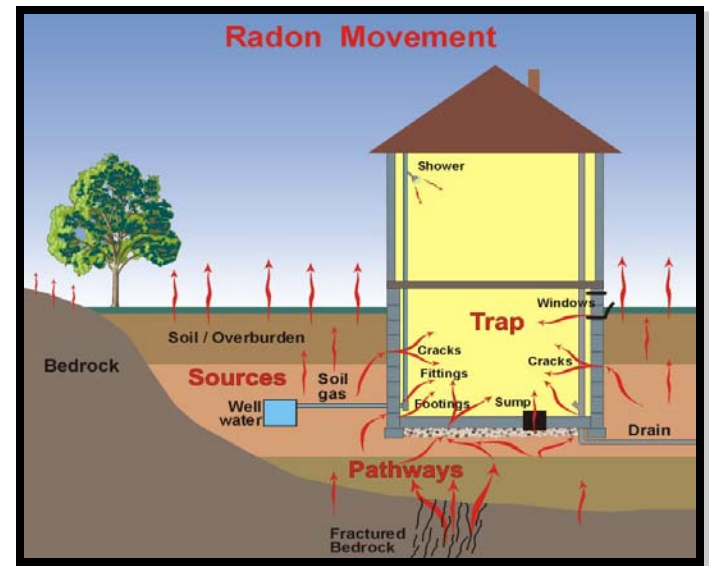
# Radon Sources

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**Radon is a natural derivative of decaying uranium and can be found in:**

- ❑ **Water**
- ❑ **Soil**
- ❑ **Rock layers**

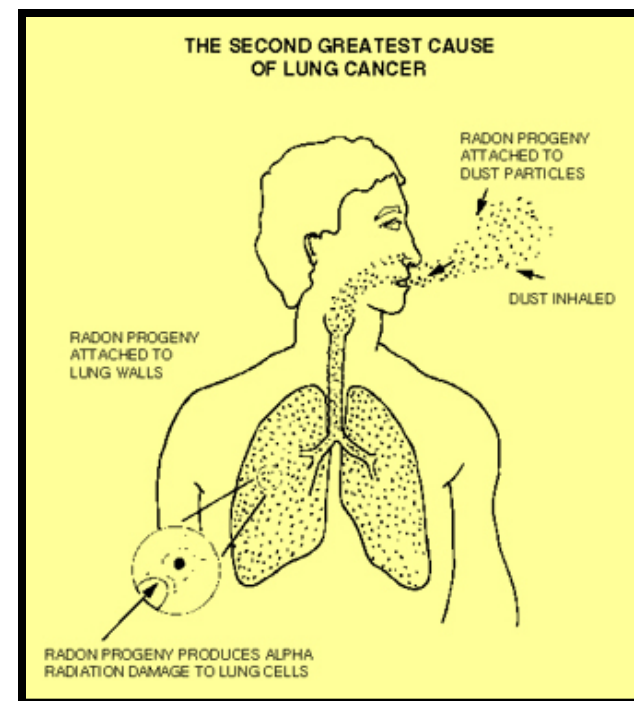
**Once radioactive particles are released into the home environment, they become a health hazard.**



# Radon & Lung Cancer

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- ❑ Radon exposure is the 2nd leading cause of lung cancer, next to tobacco smoking in the United States.
- ❑ It is estimated that nearly 20,000 Americans die annually from lung cancer linked to radon exposure
- ❑ In New Hampshire, it is estimated that 14-20% of lung cancer cases are caused by radon inhalation.



Sources: Colby, John. Department of Environmental Services, NH Environmental Public Health Tracking Program. (2010). *Issue brief: radon exposure and testing behavior*. Concord, NH: New Hampshire Department of Health and Human Services.

U.S. Department of Health and Human Services, Office of the Surgeon General. (2005). *Surgeon general releases national health advisory on radon* Washington, DC: HHS Press Office. Retrieved from <http://www.surgeongeneral.gov/pressreleases/sg01132005.html>.

# BRFSS Data

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**In 2008, data was collected using BRFSS to determine the extent of understanding around the topic of radon.**

**The survey asked Nashua residents and Hillsborough County residents not including Nashua and Manchester the following questions:**

- ☐ **Have you ever heard of radon?**
- ☐ **Which conditions are associated with radon?**
- ☐ **Has your present home been tested for radon?**
- ☐ **Was the radon level in your house at or above 4 pCi/L?**



# BRFSS Data

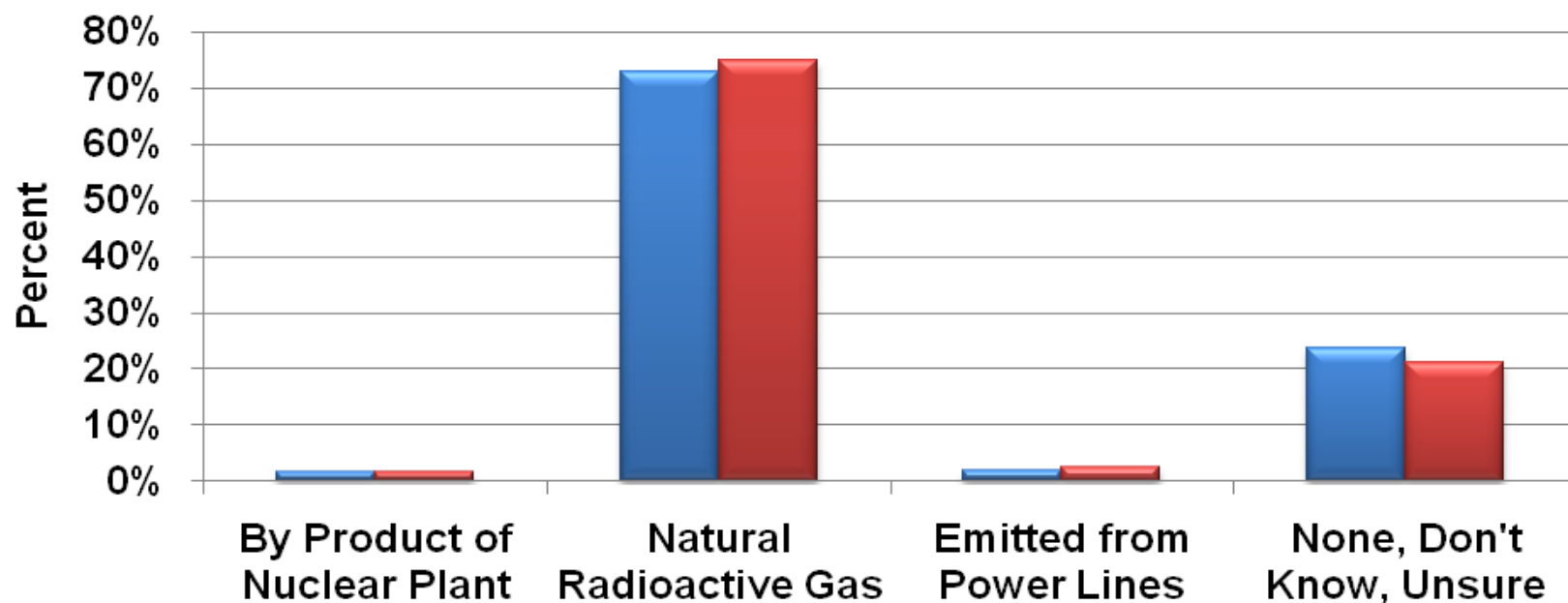
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- ❑ **83% percent of Nashua residents surveyed indicated they had heard of radon vs. 91% of Hillsborough County residents not residing in Nashua or Manchester**
- ❑ **50% of Nashua residents knew whether or not their house had been tested for radon, vs. 59% of Hillsborough county residents not residing in Nashua or Manchester**
- ❑ **20% of those who had had their homes tested in either group knew whether or not the levels were  $\geq$  the EPA's recommended limit**
- ❑ **Of those Nashua residents who found that they had radon levels over 4 pCi/L, only 11% indicated that they had had a radon vent installed in their home**

# BRFSS Data (cont.)

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## What most closely describes radon?



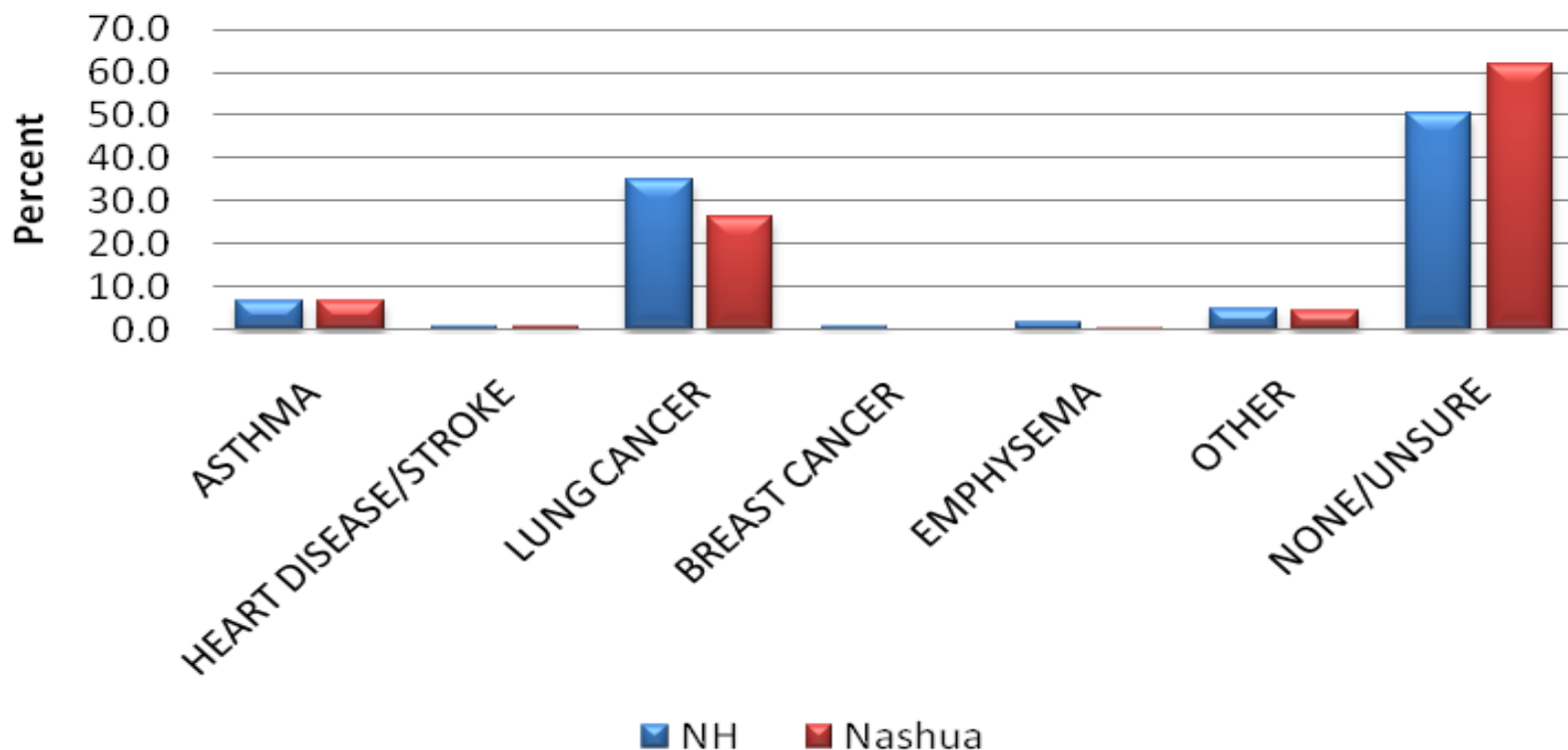
Source: NH DHHS, BRFSS

■ NH ■ Nashua

# BRFSS Data (cont.)

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**Which Health Conditions Are Associated With Radon in Air?**



Source: NH DHHS BRFSS

# NH EPHT Public Health Priority

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**NH EPHT selected this issue as a top New Hampshire public health priority because:**

- ❑ **The incidence of lung cancer in New Hampshire is increasingly at or above the national average lung cancer.**
- ❑ **New Hampshire has an increased risk due to its geological composition.**
- ❑ **An estimated 100 residents die each year due to long term exposure to radon.**
- ❑ **An estimated 250,000 New Hampshire homes are untested for radon.**

Sources: Colby, John. Department of Environmental Services, NH Environmental Public Health Tracking Program. (2010). *Issue brief: radon exposure and testing behavior*. Concord, NH: New Hampshire Department of Health and Human Services.

EPHT Program, *The Tracker*, Winter 2008, Radon and Lung Cancer Issue Brief: Using the Data to Inform Communities, [www.nh.gov/epht/publications/index.htm](http://www.nh.gov/epht/publications/index.htm)

# NH EPHT Data (cont.)

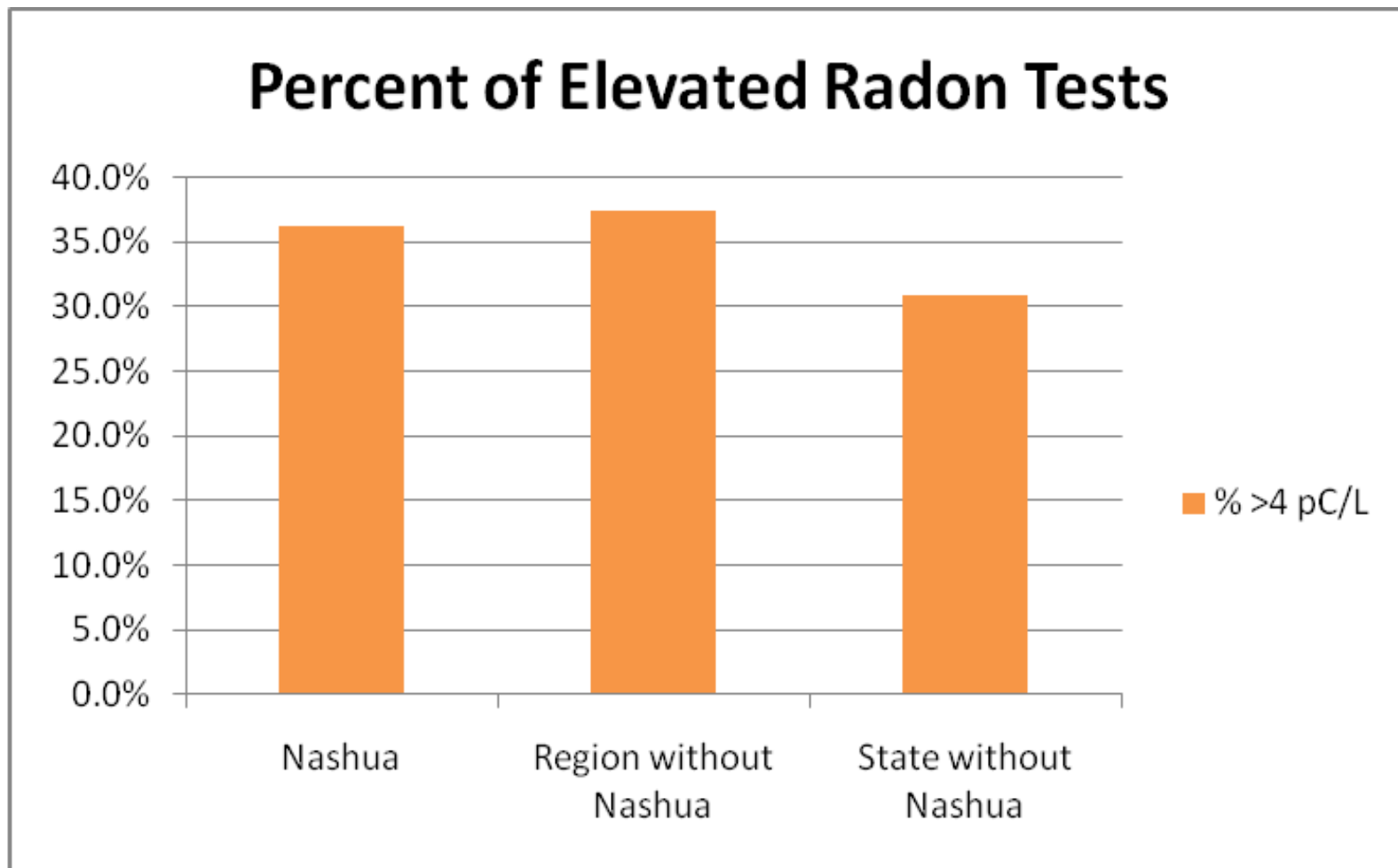
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## Number of Radon Tests, Number of Elevated Tests (> 4 pCi/L ) & Percent Elevated Tests: Nashua, GNR & State of NH, 1987-2009

	# tests	# >4 pCi/L	% >4 pCi/L
<b>Nashua</b>	<b>246</b>	<b>89</b>	<b>36.2%</b>
<b>GNR minus Nashua</b>	<b>3,864</b>	<b>1,445</b>	<b>37.4%</b>
<b>NH minus Nashua</b>	<b>24,910</b>	<b>7,670</b>	<b>30.8%</b>

# NH EPHT Data Cont.

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Source: Colby, John. Department of Environmental Services, NH Environmental Public Health Tracking Program. (2010).

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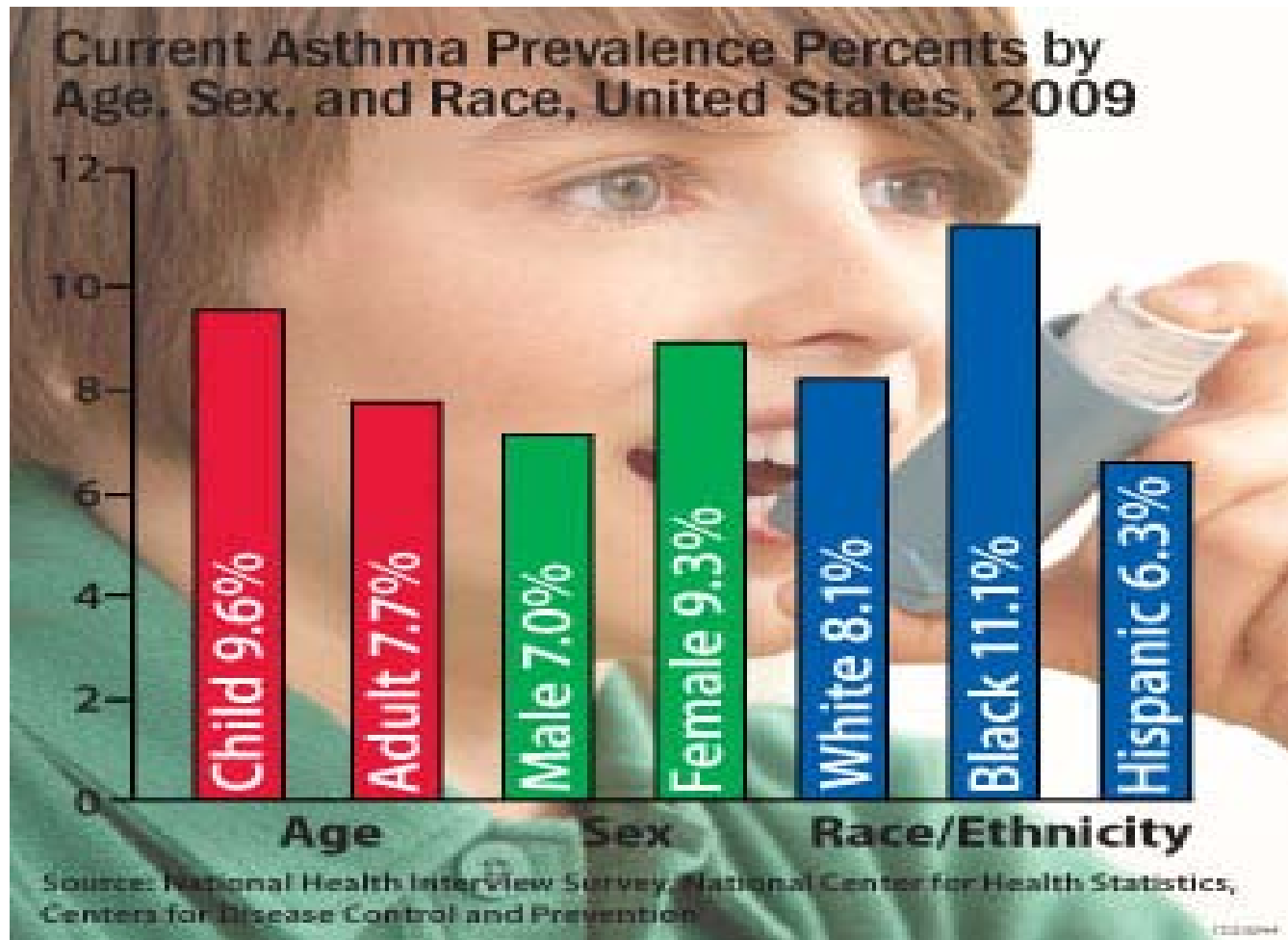
# Asthma

# Asthma

- ☐ Asthma is a respiratory disease that is characterized by: episodes of wheezing, breathlessness, chest tightness & nighttime or early morning coughing.
- ☐ Asthma is the most common chronic childhood illness.
- ☐ Low income families are more commonly affected
- ☐ 50% of asthma is allergic asthma and can be attributed to common household triggers like mold, cockroach/pest dander, pet dander, particulate matter, and smoke.



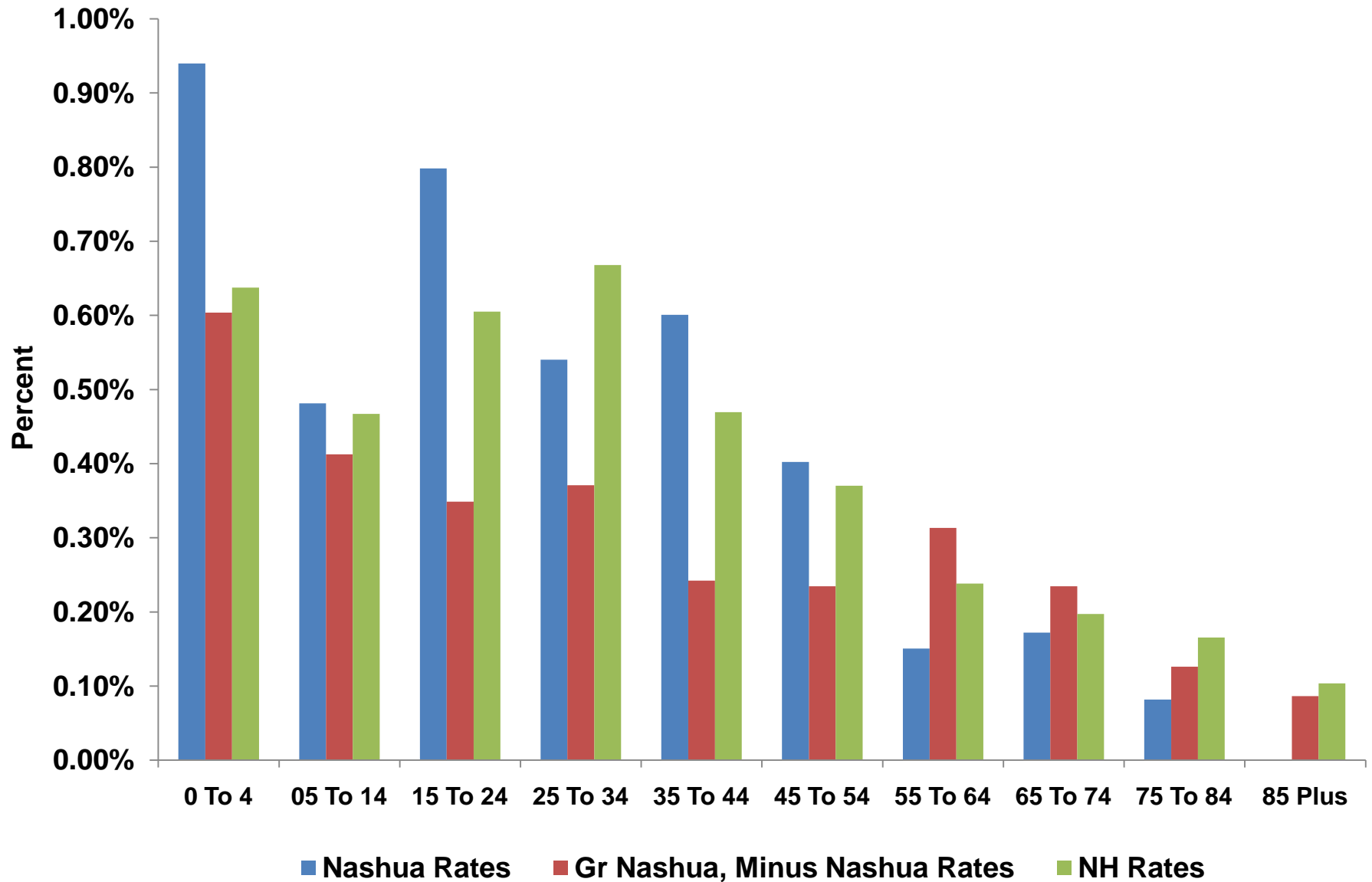
# Asthma



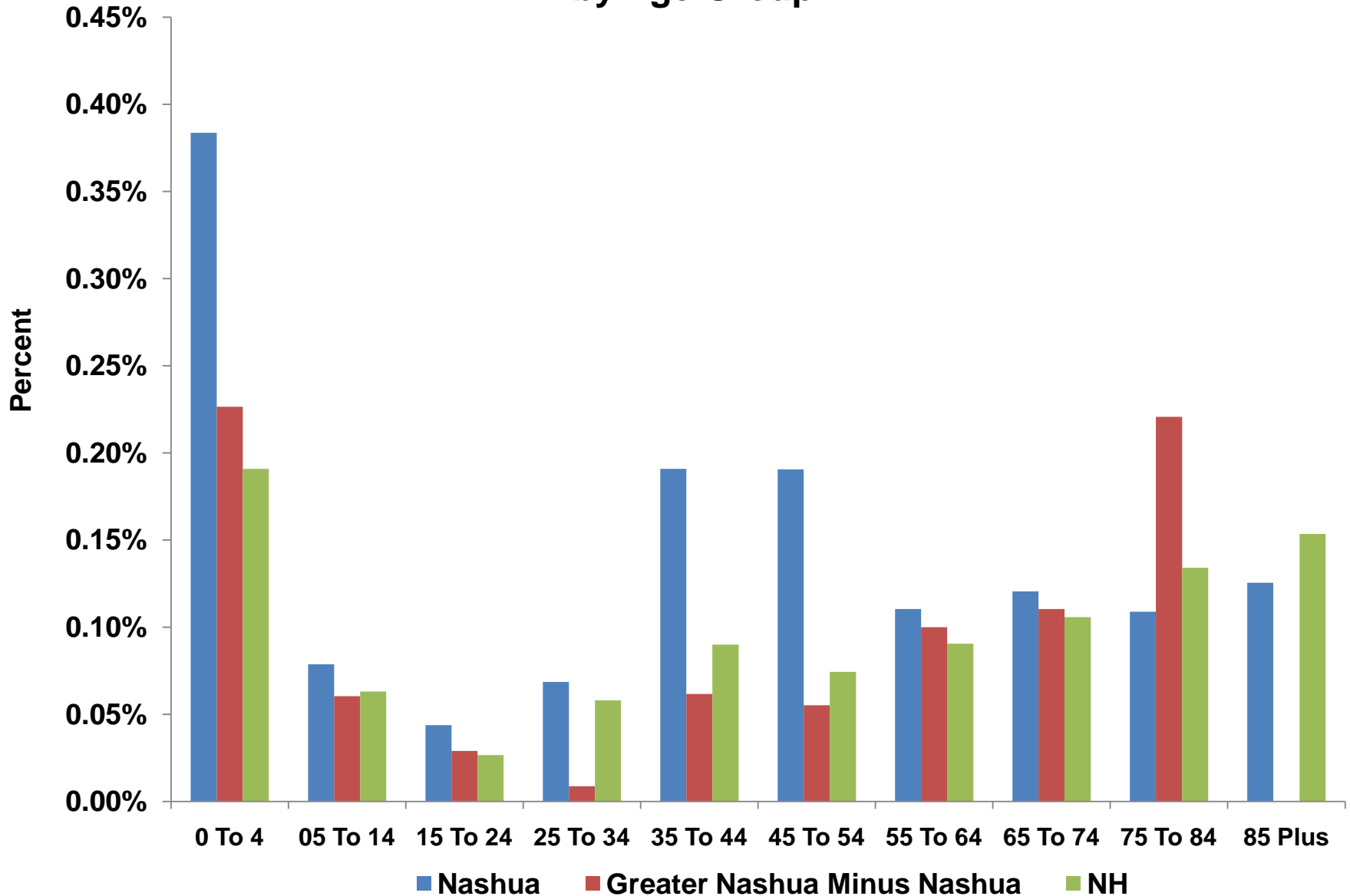
# Asthma in Nashua

Nashua Asthma Prevalence			
Nashua Asthma	Row Percent	95% Confidence Limits for Row Percent	
Nashua by Lifetime Asthma	15.1	11.5	18.8
Nashua by Current Asthma	8.7	6.3	11.1

## Asthma related ED visits 2007 per Age Group



## Inpatient Hospitalizations related to Asthma in 2007 by Age Group



# Asthma in Nashua

## 2007 Average Cost per Nashua Asthma–related ED Discharge by Payer

<b>Medicaid</b>	<b>\$1,003.36</b>
<b>Medicare</b>	<b>\$1,420.86</b>
<b>Private/Other</b>	<b>\$1,143.69</b>
<b>Self pay</b>	<b>\$997.43</b>
<b>Workers Compensation</b>	<b>\$1,109.00</b>

# Asthma in Nashua

## Sum of Costs per Payer for Asthma-related ED Visits in Nashua 2007

<b>Medicaid</b>	<b>\$89,299</b>
<b>Medicare</b>	<b>\$39,784.00</b>
<b>Private/Other</b>	<b>\$208,151.00</b>
<b>Self pay</b>	<b>\$127,671.00</b>
<b>Workers compensation</b>	<b>\$1,109.00</b>

# Asthma in Nashua

## 2007 Average Cost per Nashua Inpatient Discharge for Asthma per Payer

**Medicaid**

**\$5,966.04**

**Medicare**

**\$18,652.31**

**Private/Other**

**\$8,895.33**

**Self pay**

**\$7,018.86**

# Asthma in Nashua

## **Sum of Costs per Payer for Inpatient Hospitalizations related to Asthma in Nashua 2007**

**Medicaid**

**\$137,219.00**

**Medicare**

**\$484,960.00**

**Private/Other**

**\$435,871.00**

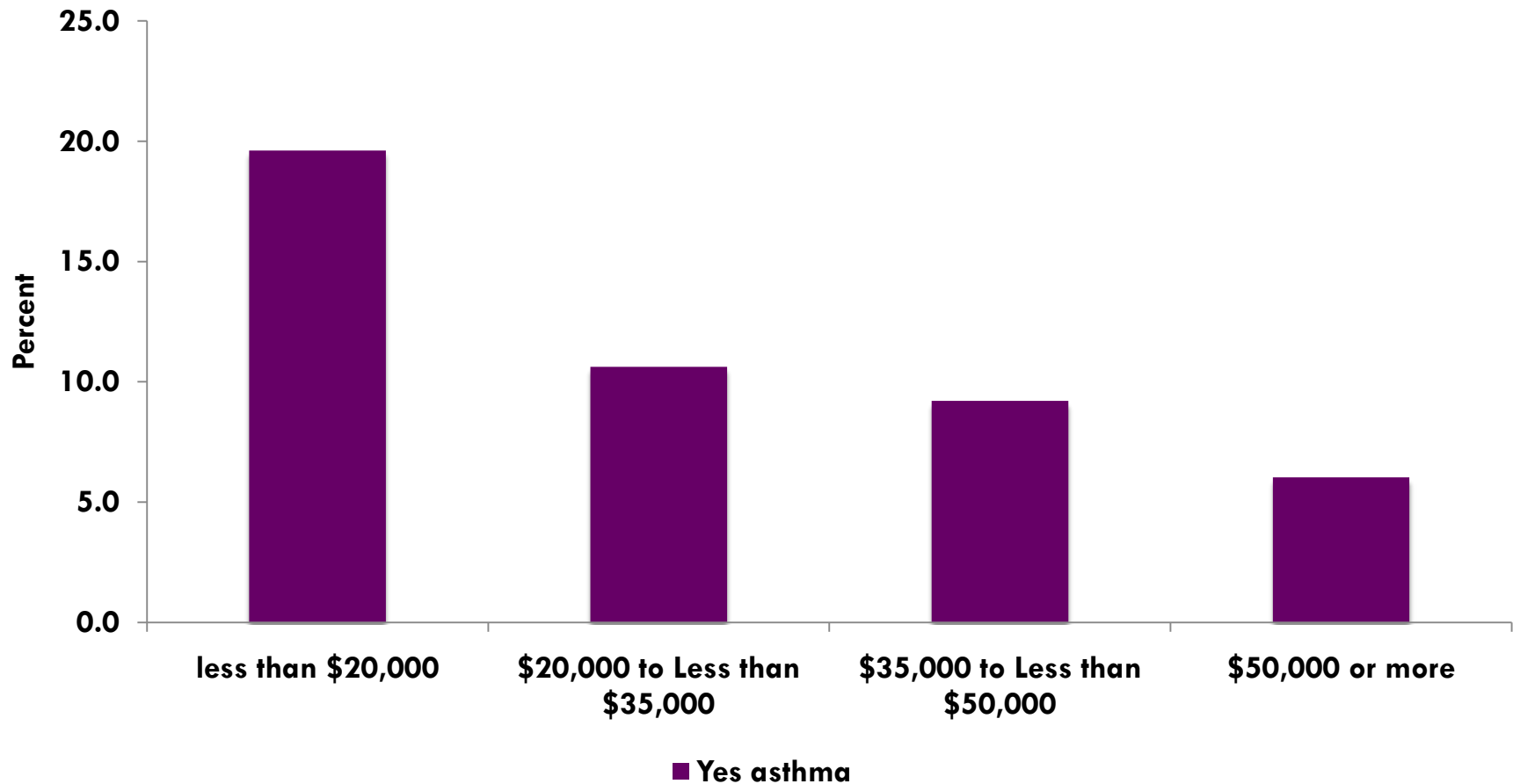
**Self pay**

**\$154,415.00**



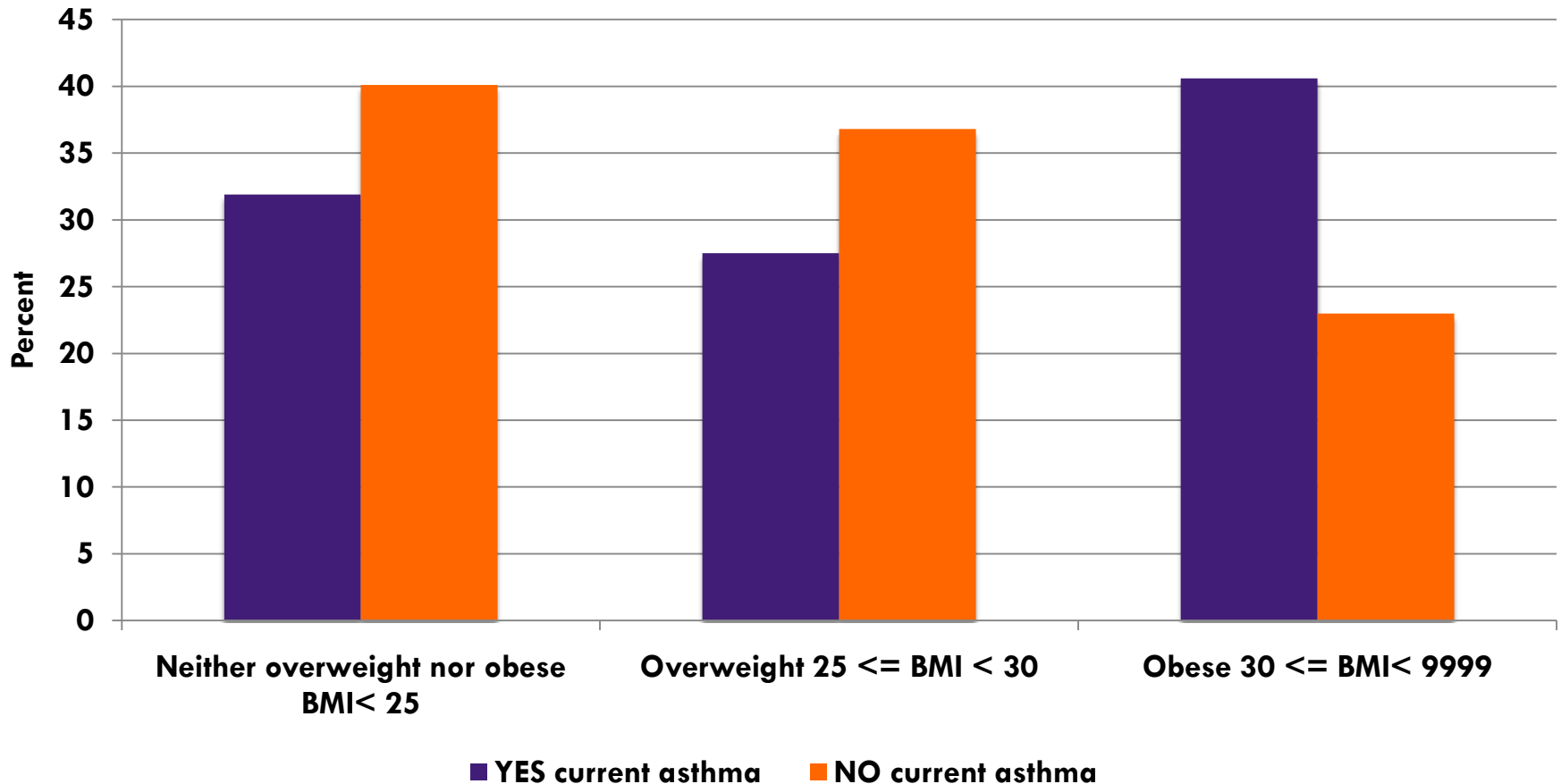
# Asthma in Nashua

**Nashua Childhood Current Asthma by Income**



# Asthma in Nashua

**Current Asthma Status by 3 Categories of BMI**



# Asthma in Nashua

**Child Current Asthma by Vaccinated for Seasonal Flu, last 12 months  
Controlling for reported residence=Hillsborough County**

<b>Child Current Asthma</b>	<b>Vaccinated for seasonal flu, last 12 months</b>	<b>Row Percent</b>	<b>95% Confidence Limits for Row Percent</b>	
<b>Yes</b>	<b>Yes</b>	<b>47.2</b>	<b>37.4</b>	<b>57</b>
<b>No</b>	<b>Yes</b>	<b>23</b>	<b>20.2</b>	<b>25.8</b>

# Asthma in Nashua

## Current Adult Asthma by Vaccinated for Seasonal Flu, past 12 months Residence in Nashua

Current Asthma	Vaccinated for Seasonal Flu, past 12 months	Row Percent	95% Confidence Limits for Row Percent	
Current asthma	Yes	50	40.6	59.4
No current asthma	Yes	37.6	34.4	40.9

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# Air & Water Quality

# The Air We Breathe...

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**The health of human beings is affected by the quality of the air we breath. Toxins & pollutants are released in a variety of ways:**

- ☐ **Natural Processes**
- ☐ **Human Activities**
  - **Industrial plants**
  - **Power plants**
  - **Vehicles**

# Impact of Poor Air Quality

- ❑ Premature Death
- ❑ Cancer
- ❑ Long term damage to respiratory & cardiovascular systems
- ❑ Greater health risk to sensitive individuals (those with heart and lung diseases, diabetics older adults, children)



# To Protect the Public's Health...

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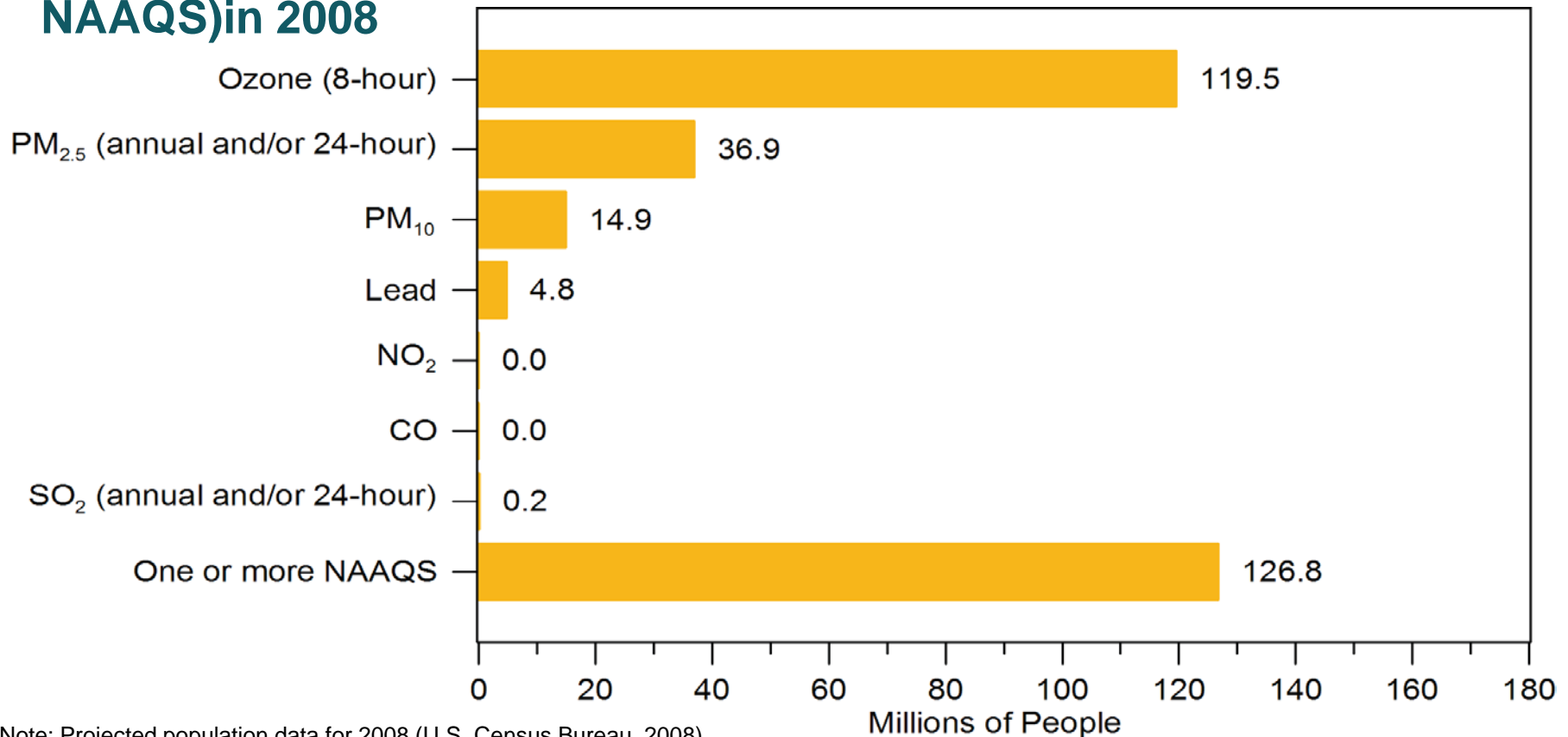
**The Environmental Protection Agency has set National Ambient Air Quality Standards (NAAQS) for 6 Key Pollutants:**

- ❑ Ozone**
- ❑ Fine Particulate Matter**
- ❑ Nitrogen Dioxide**
- ❑ Sulphur Dioxide**
- ❑ Carbon Monoxide**
- ❑ Total Reduced Sulphur Compounds**



# Air Quality

**Number of people (in millions) living in counties with air quality concentrations above the level of the primary (health-based) NAAQS) in 2008**



Note: Projected population data for 2008 (U.S. Census Bureau, 2008).

Source: EPA

# Air Quality Index (AQI)

A scale based on pollutant concentration for:

- ❑ Ground level ozone
- ❑ Particulate pollution
- ❑ Carbon Monoxide
- ❑ Sulfur Dioxide

## What is the Air Quality Index?

<b>Good 0-50</b>	Air quality is considered satisfactory, and air pollution poses little or no risk.
<b>Moderate 51-100</b>	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
<b>Unhealthy for Sensitive Groups 101-150</b>	Members of sensitive groups* may experience health effects. The general public is not likely to be affected.
<b>Unhealthy 151-200</b>	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
<b>Very Unhealthy 201-300</b>	Health alert: everyone may experience more serious health effects.
<b>Hazardous 301-500</b>	Health warnings of emergency conditions. The entire population is more than likely to be affected.

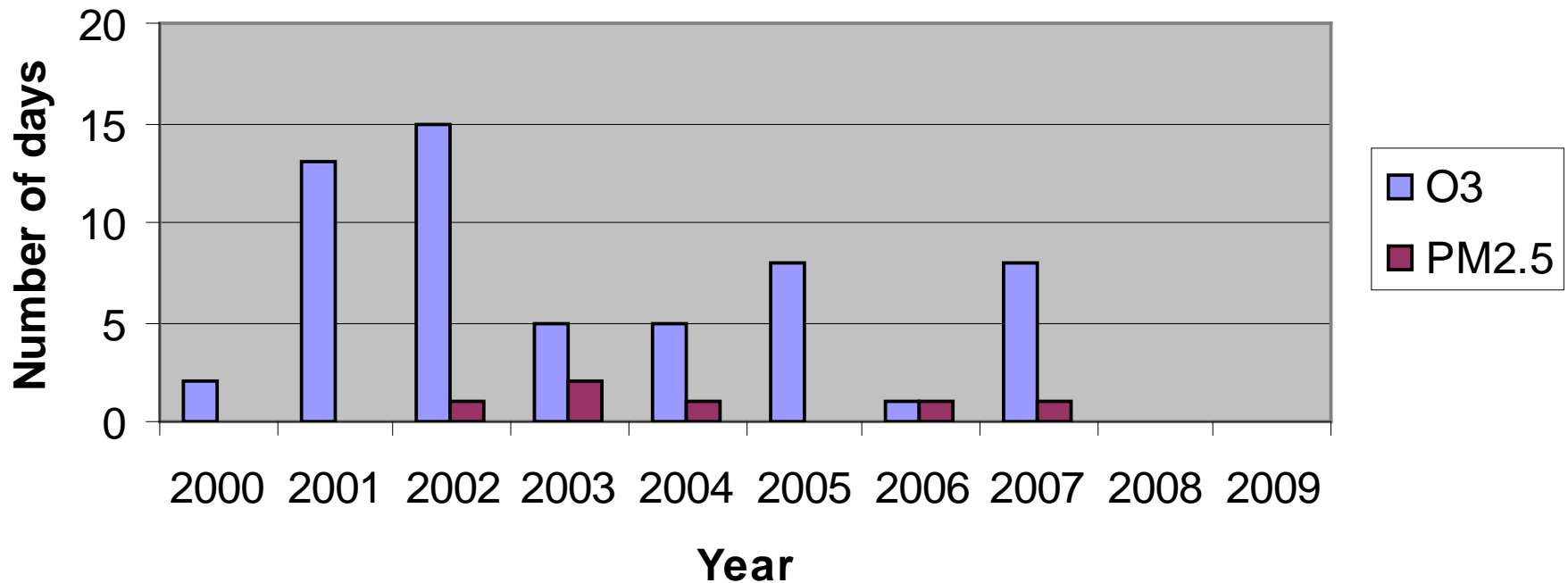
\* Sensitive groups include active adults, people with heart or lung disease (including asthma), older adults and children.

# How is NH doing?

- ❑ NH experiences an average of 10 days per year during which the state's AQI exceeds 100.
- ❑ 92% of air pollution (ozone & small particle pollution) occurring in NH is transported from sources outside of the state.
- ❑ The health-related impact of air pollution transported into NH exceeds \$1 billion annually. This *does not include* the increased costs of doing business, increased healthcare claims & the loss of worker productivity due to respiratory illness.

# What about the Nashua Region?

## Number of National Air Quality Standard (NAAQS) Exceedances



Source: New Hampshire Department of Environmental Services

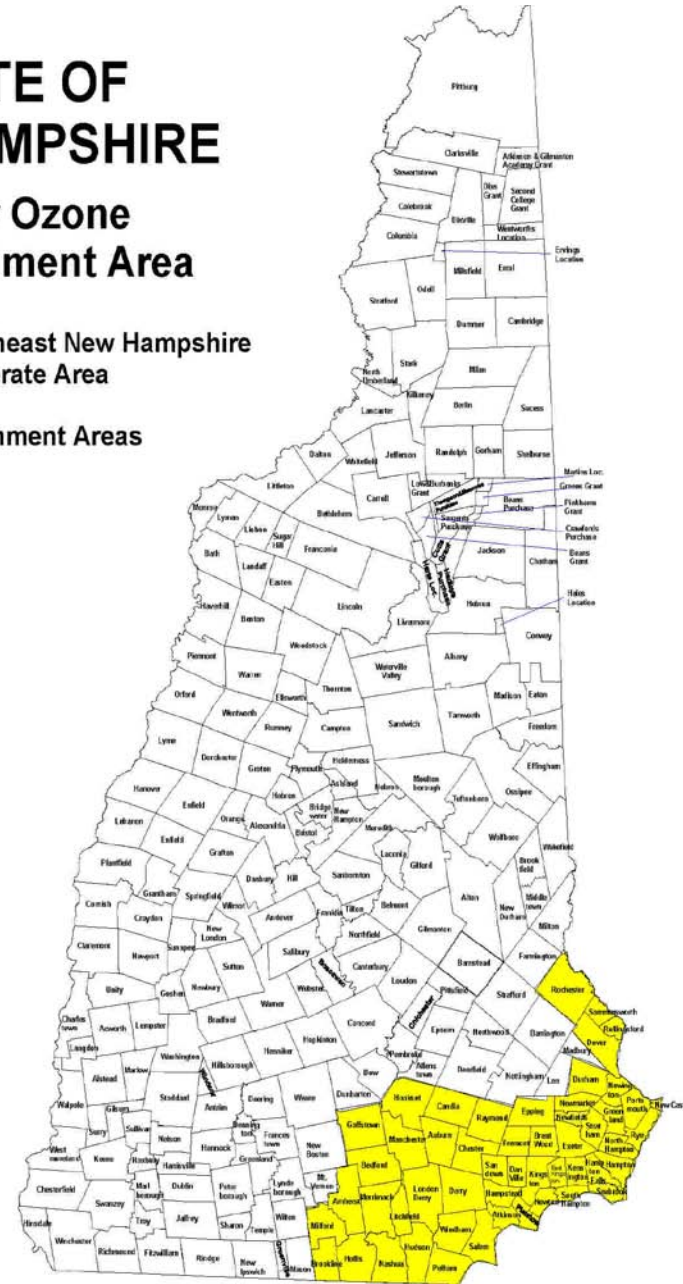
# Non-Attainment Area for Ozone

Southern NH & the  
Nashua region have  
historically experienced ozone  
levels higher than the  
NAAQS of 0.075ppm.

These regions have been  
designated as Non-attainment  
areas for ozone by the EPA

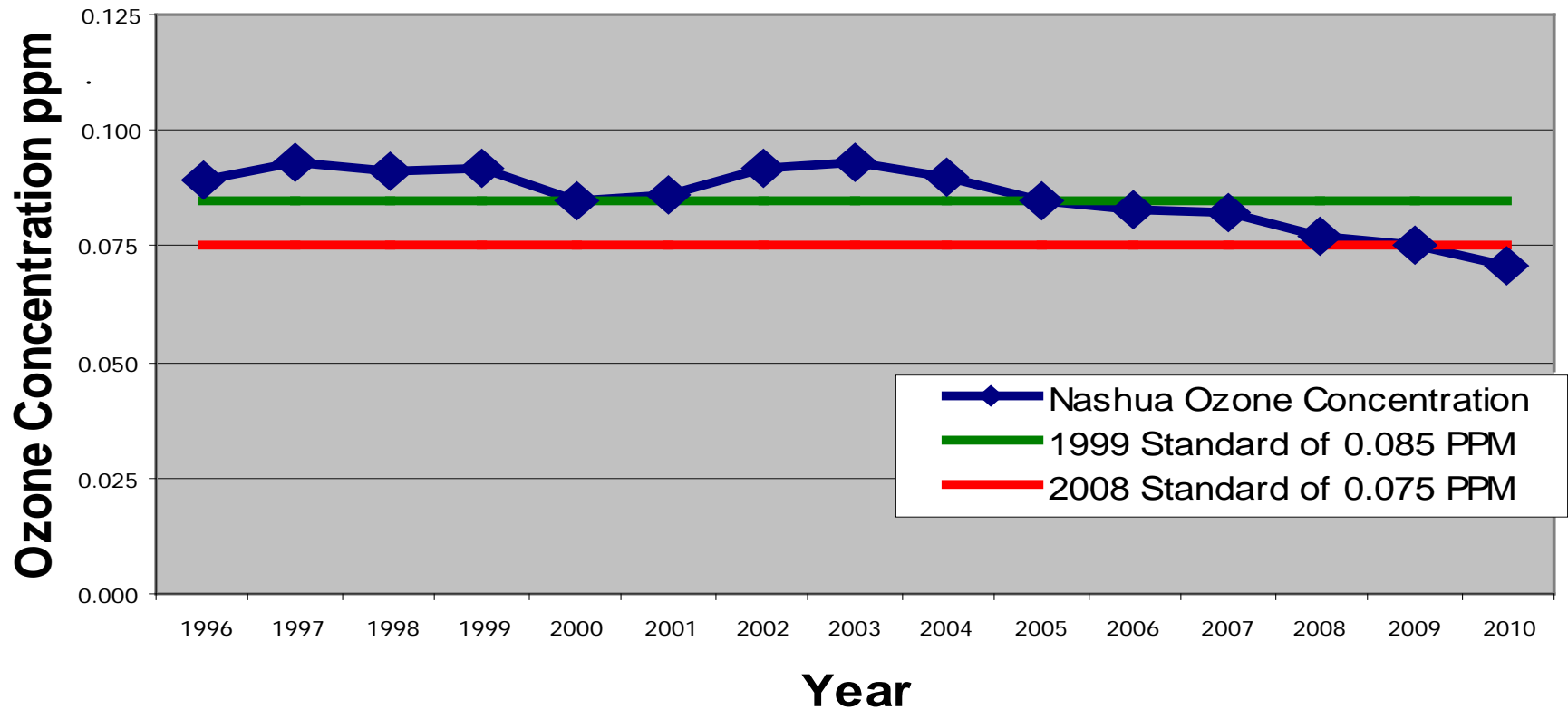
## STATE OF NEW HAMPSHIRE

### 8-Hour Ozone Nonattainment Area



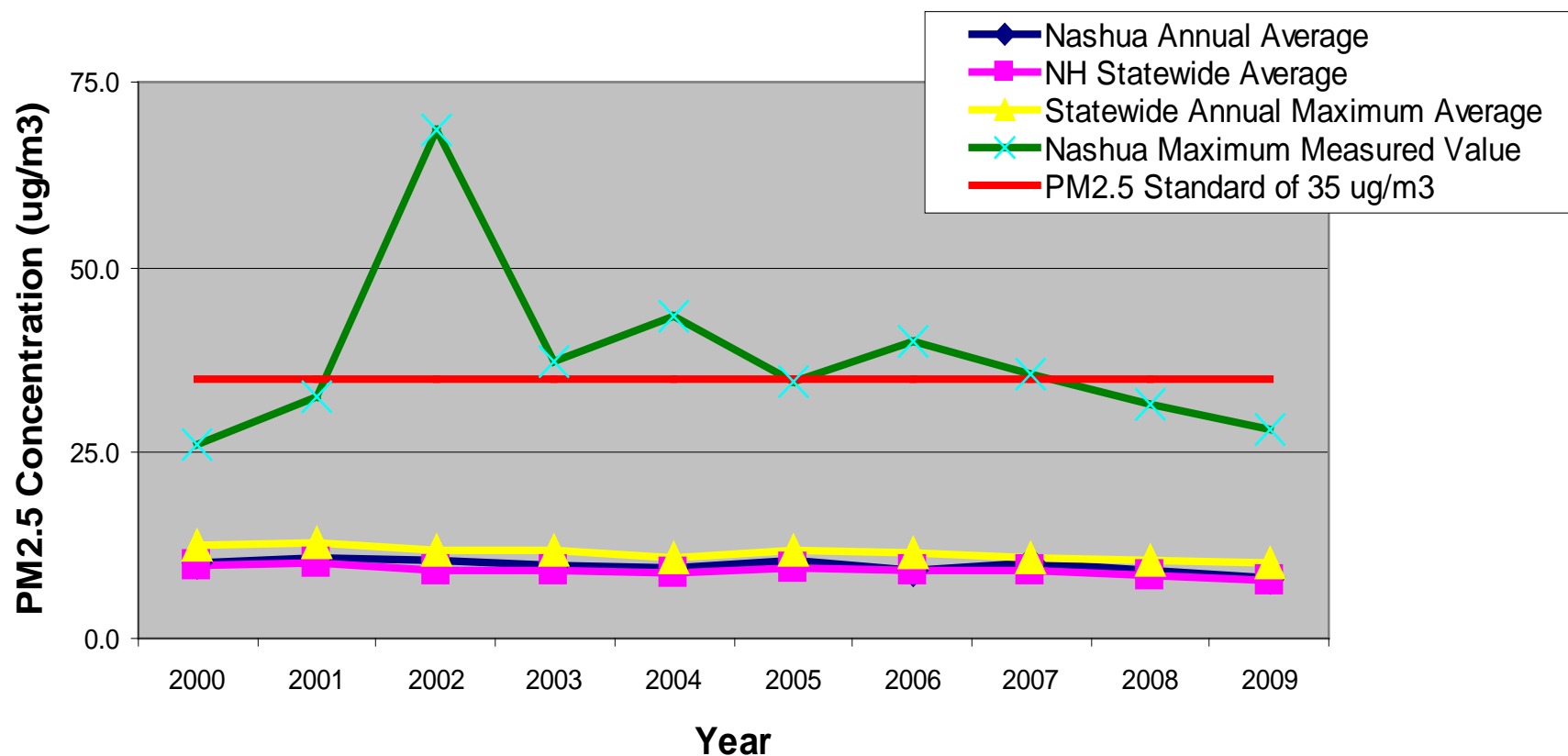
# Nashua Region Ozone

## Nashua 8 hour Ozone Design Value



# Particulate Matter NH vs. Region

**PM2.5 Annual Concentration Levels  
2000-2009**

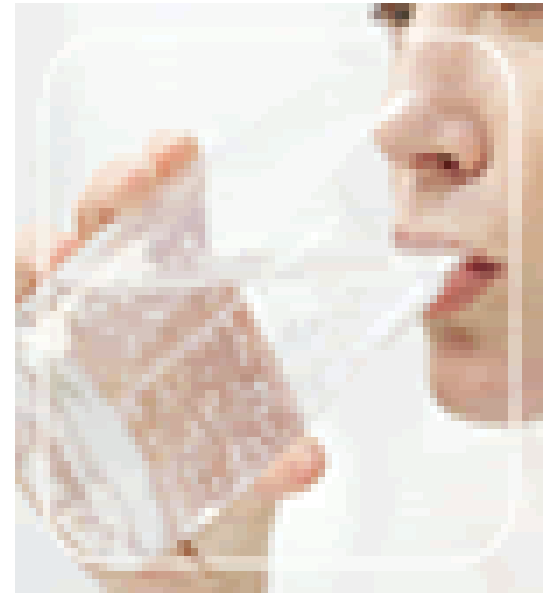


Data Source: New Hampshire Department of Environmental Services

# The Water We Drink...

**The health of human beings is affected by the quality of the water we drink. Water pollutants are released into water systems in a variety of ways:**

- ☐ **Natural Processes**
  - **Radioactive minerals**
- ☐ **Human Activities**
  - **Agricultural runoff**
  - **Production waste**
  - **Disinfection by-products**





# Impact of Poor Water Quality

- ❑ **Water Borne Disease**
  - **Mild to Severe Gastrointestinal Illness**
- ❑ **Chemical Contamination**
  - **Increased Risk of Cancer**
  - **Damage to skin, kidney, liver, thyroid**
  - **Problems in reproductive, immune, circulatory & nervous systems**
- ❑ **Greater health risk to sensitive individuals (those with existing medical conditions, older adults, children)**

# To Protect the Public's Health...

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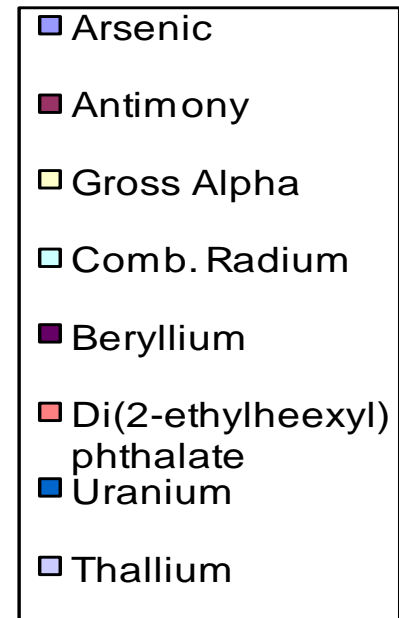
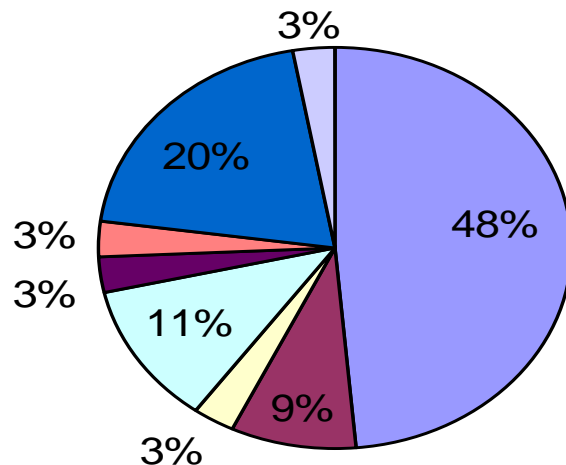
**The Environmental Protection Agency has established National Primary Water Regulations for Public Water System Maximum Contaminant Levels (MCLs) under the Safe Water Drinking Act:**

- ❑ Microorganisms**
- ❑ Disinfectants**
- ❑ Disinfection Byproducts**
- ❑ Inorganic Chemicals**
- ❑ Radionuclides**

# How is NH doing?

**In 2009, New Hampshire experienced 123 MCL violations incurred by 52 Public Water Systems**

□ **Percentage of Systems Exceeding MCL by Contaminant**



# How is the Nashua Region doing?

The Pennichuck Water Works (PWW) is the primary active public water system serving 85,000 people in the Nashua region

- ❑ This system is approved for operation and is subject to routine water quality monitoring and a sanitary survey every three years.
- ❑ As of November 23, 2010 PWW is in compliance with state and federal regulations as pertaining to the Safe Drinking Water Act.
- ❑ PWW has only ever had 2 violations and no site visit deficiencies:
  - 2002 treatment technique violation
  - 2008 monitoring and reporting violation

# What about private wells?

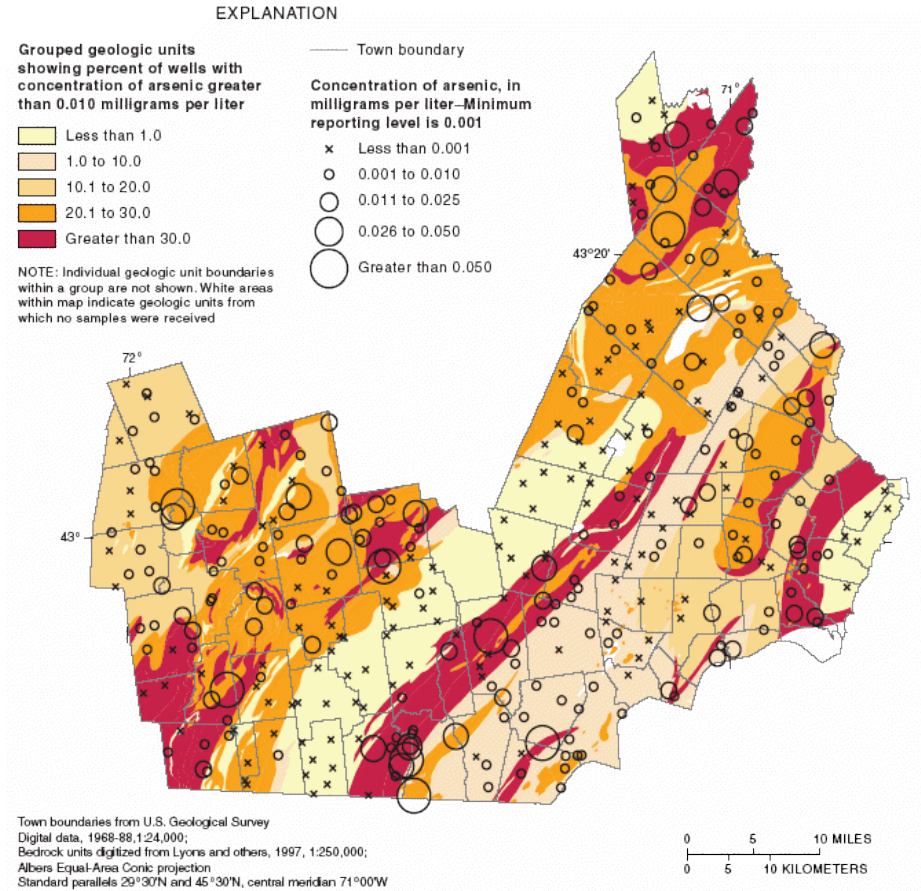
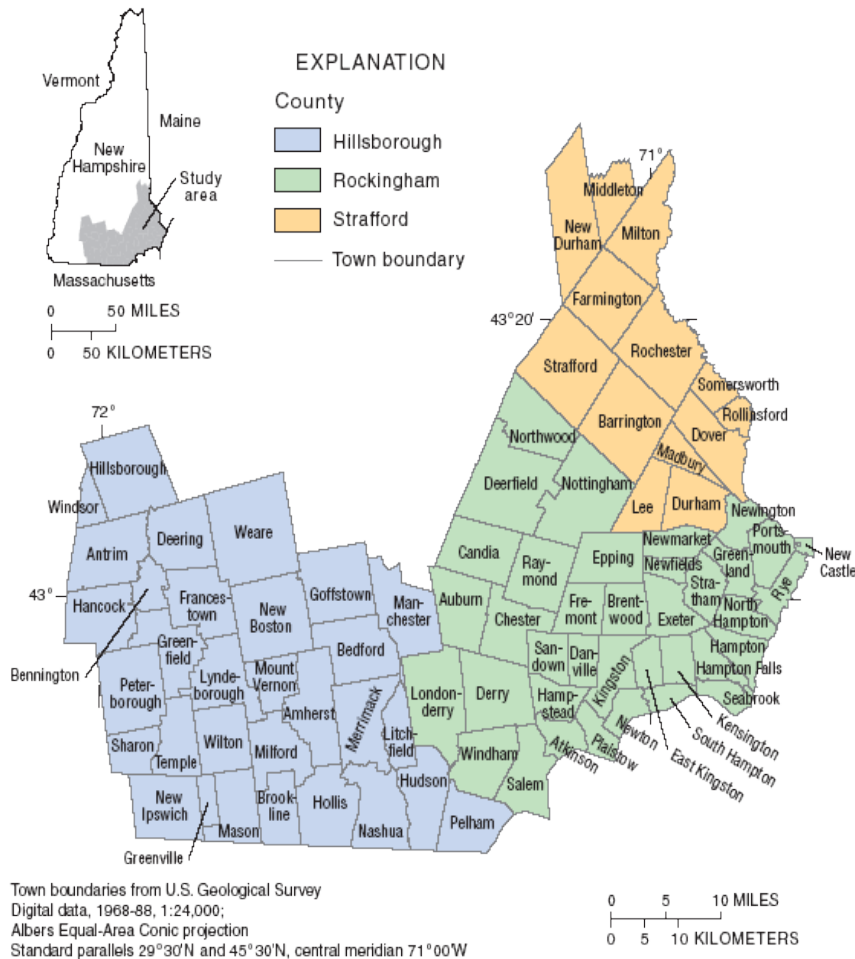
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- **Approximately 40% (526,000) of NH residents obtain their water from private wells**
- **Private wells are not regulated by federal standards**
- **These residents are less likely to have their drinking water tested/treated**
- **These residents are more likely to unknowingly consume water that contains harmful contaminants**

# What about private wells (cont)?

- **NH bedrock deposits natural contaminants such as arsenic and radionuclides which are known to occur in a significant percentage of wells at concentrations exceeding MCLs**
- **Lead and copper from older plumbing are also frequently detected in tap water**

# Arsenic in Private Wells



Source: New Hampshire Department of Environmental Services (DES), "Private Well Working Group White Paper". Revised August 2009.

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# Tobacco

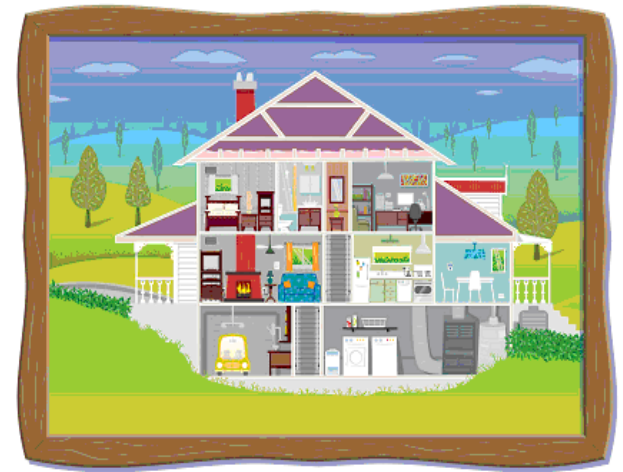


# Tobacco Usage

- ❑ Tobacco kills more than 443,000 Americans every year; \$96 billion in medical costs
- ❑ Death from tobacco usage is preventable
- ❑ Survey results show that 43.9% of Nashua residence were smokers at one time (46.8 % NH residents)
- ❑ Currently, 17% of Nashua residents (16% NH) are smokers
- ❑ Nationally, decreasing numbers in smokers has stalled
- ❑ The Healthy People 2020 goal is to reduce cigarette smokers to 12%, a number that Nashua does not yet meet according to the survey

# Summary

- **Lead:** While lead level trends are moving in the right direction, screening rates are low and the risk of lead exposure is high due to the high proportion of older homes
- **Poisoning:** The number and severity of unintentional poisonings are relatively low; most are handled in home effectively with assistance. Child safety education and encouraging the use of CO detectors would benefit community health.
- **Radon:** Further education about the risks of radon would likely encourage testing and contribute toward lowering the health hazards presented.



# Summary (cont.)

- **Asthma:** Asthma continues to be a significant and costly health problem especially among low income families. Efforts to improve air quality and reduce allergens should be supported.
- **Water quality:** The primary public water supply has an excellent safety record. An effort to educate those homeowners with private wells about the need to regularly test for contaminants would likely benefit the health of the community.
- **Air Quality:** The primary air pollutants are ozone and particulate matter; encouraging the use of alternative transportation to decrease vehicle emissions and working regionally to reduce the out of state contribution of pollutants would improve air quality in NH



# Acknowledgements

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